



Early Clinical Results of a Single-Tooth Cross-Bite Correction by Using Porcelain Laminate Veneer: Case Report

Çöttert HS* and Çöttert İ

Ege University, Faculty of Dentistry, Department of Prosthodontics, Izmir, Turkey

*Corresponding Author: H Serdar Çöttert, Ege University, Faculty of Dentistry, Department of Prosthodontics, Izmir, Turkey.

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Abstract

Porcelain laminate veneers (PLVs) are known as successful restorations in order to correct the unsightly anterior teeth and establishment of an aesthetic anterior appearance with their aesthetic and conservative properties in modern dental practice. Several aesthetic and functional problems can be solved by employing PLVs. Non-orthodontic treatment of dental arch crowding and final correction of orthodontic treatment are the known indications of PLV restorations. However, their usage in order to correct the cross-bite is still questionable. The aim of present study is to report the non-orthodontic treatment of an upper left cuspid exhibiting cross-bite, by using a PLV restoration. After 30 months of follow-up, restoration still functional and free of neither any problem nor complaint.

Keywords: Veneer; Laminate Veneer; Porcelain Laminate Veneer; PLV; Cross-Bite

Abbreviation

PLV: Porcelain Laminate Veneer.

Introduction

Porcelain laminate veneers (PLVs) have widen their popularity with their favourable specifications such as conservative manner, high bond strength and superior aesthetics. The teeth formerly required fully covered by a crown restoration, now can be restored by PLVs. Aesthetic appearance of anterior dentition can be upgraded with minimal invasion and for long time [1]. Several clinical situations solved successfully by employing PLVs, have been reported in related literature. These clinical problems can mainly be mentioned as; the aesthetic enhancement of anterior teeth [1], masking tetracycline and other discolorations [2,3], correction of peg-shaped lateral incisors [4], closing diastemata [5], reducing oversized tooth dimensions [6], final corrections following orthodontic treatment [7], transformation of teeth [8] and amelogenesis imperfecta [9]. Conservative character, convenience to the minimally invasive operation, high bond strength, vital-like translucency, high aesthetic properties have been reported in these

papers. Clinical service longevity has also been studied and high survival rates reported [10-13]. Factors influencing the clinical success of PLV restorations have been discussed [10-13] and the precautions against the failures have also been studied [14-18]. However, effects of the unsuitable centric and eccentric occlusal relationships occurring in cross-bite, have not been found in reviewed literature.

The aim of this study is to report the case with cross-bite at upper left cuspid, aesthetic and functional improvement of this tooth by a PLV restoration and the results of 30 months follow-up of this restoration.

Materials and Methods

A 32-years-old male patient was admitted to the clinics of Ege University Faculty of Dentistry, Department of Prosthodontics. His chief complaint was the malpositioned upper left cuspid. Extraoral,

intraoral and radiographic examinations did not show any carious lesion or periodontal problem but only the upper left cuspid was observed in a cross-bite relation with antagonist arch (Figure 1,2). Patient was informed about orthodontic and restorative treatment protocols and he preferred restorative intervention aiming a PLV restoration.

and the diagnostic casts were obtained. Centric and eccentric maxillomandibular relations were recorded (Figures 3,4). Casts were mounted on a semi-adjustable articulator. An autopolymerizing (Tem Dent, Schütz Dental GmbH, Rosbach, Germany) mock-up was performed on diagnostic cast so as not to interfere with antagonist dentition during left lateral movement of mandible. Mock-up was tried in mouth; final corrections were made and the preparation outline was decided.



Figure 1: Maxillary right cuspid in centric occlusion.



Figure 3: Right lateral movement.



Figure 2: Maxillary left cuspid exhibiting cross-bite in centric occlusion.



Figure 4: Left lateral movement.

Preliminary impressions were made with irreversible hydrocolloid impression material (CA37, Cavex Dental BV, Haarlem, Holland) and stock trays. Impressions were poured in dental stone (Gilodur, Giulini Chemie, Ludwigshafen, Germany)

Juxtagingival mini-chamfer was prepared facially by using a labial bur followed by a red ring finishing bur (Komet Gebr. Brasseler GmbH and Co. KG, Lemgo, Germany). Chamfer was extended to the

mesial and distal proximal contact points as following the trace of gingival margin. Occlusal half of the vestibular face was not ground. Incisal edge was reduced 1mm in order to the mock-up study and overlapped 1mm palatally as to create a mini-chamfer (Figure 5). Marginal gingiva was gently retracted by 4#0 knitted dry chord (Ultrapack, Ultradent, Salt Lake City, UT, USA), impression was made with polyether elastomeric impression material (Pentasoft Duo-Mix, 3M-ESPE, Seefeld, Germany) and master cast was obtained. Mock-up was adapted to the prepared tooth by addition of same self-cure material and used for provisionalization and this provisional restoration was luted temporarily by non-eugenol cement (Temp-Bond NE, Cavex Dental). PLV core was manufactured with lithium disilicate glass-ceramic by employing heat-press technique and veneering ceramic was baked (IPS E-Max Press, Ivoclar-Vivadent, Schaan, Liechtenstein). Marginal and internal fit, colour, translucency, form, centric and eccentric relations were checked in clinical try-in appointment. Attention was paid to the guidance during the left lateral excursion. Final minor corrections were made and the restoration was glazed.

orthophosphoric acid (Ultraetch, Ultradent), rinsed, air dried, bonded (Excite, Ivoclar-Vivadent) and luted with a dual-cure resin composite cement (Variolink II, Ivoclar, Vivadent). Excess material was wiped out and the cement was light cured with an energy density of 480mW/cm² (Optilux Demetron, Danbury, CT, USA). All of the finishing line was polished with the consequent use of the yellow band high speed diamond finishing bur and polishing discs (Soflex Discs, 3M-ESPE). Patient was recalled for six months of controls (Figures 6-8).



Figure 5: Juxtagingival mini-chamfer following marginal contours and incisal overlap finishing with palatal mini-chamfer.

Prior to the luting, PLV intaglio was treated with 9,5% HF (hydrofluoric acid) (Porcelain Etch, Ultradent) for 20 seconds, then rinsed, dried and silanized (Silane, Ultradent). Bonding agent (Excite, Ivoclar-Vivadent) was applied, air thinned and protected from light until the luting. Provisional restoration was removed, cement remnants were cleaned, tooth was brushed with non-aromatic pumice with water. Etched 15 seconds with 37%



Figure 6: Corrected cross-bite of upper left cuspid in centric occlusion.



Figure 7: Corrected cross-bite of upper left cuspid in left lateral movement.



Figure 8: Occlusal view of PLV.

Results and Discussion

After 30 months, clinical and radiographic examinations revealed that the tooth is free of any problem, endodontic and periodontal tissues are healthy, restoration is intact and in function. It is known that PLVs can be used in the non-orthodontic treatment of some anterior crowding or as a complement to orthodontic treatment [6,7]. However, it should be noted that, a PLV for the recovery of a cuspid from cross-bite, will encounter destructive forces during the guidance of the chewing cycle. In this study it was predicted that, the free incisal edge of the PLV would encounter severe forces during side movement. Some measures were taken against these forces. Preparation was performed within the enamel layer and no preparation was made from some regions. It is a known fact that PLVs adhere to enamel tissue better than dentine [12,13]. In addition to the enamel preservation; an overlap design consisting a palatal mini-chamfer was performed in order to transfer the functional forces to the abutment tooth as advised in several studies [10,12,13]. The relation of PLV palatal surface with antagonists during left lateral excursion was planned by mock-up. This acrylic mock-up was used as temporary restoration after preparation. Diagnostic wax-up, mock-up and aesthetic pre-evaluative temporaries were reported as the useful techniques to establish an aesthetic appearance beside the preservation of hard tooth tissues [6,8,14-18]. Since the abutment tooth is inclined, inciso-gingival length of PLV has exceeded the tooth. Survival rates of initially extended PLVs were found lower than non-extended similar [13]. Response of the extended PLVs against the functional loads was investigated with finite element analysis and it has been

reported that extensions should be considered more functional than aesthetic. Angulation and the level of the loads acting on the free extensions were found important [18].

Conclusion

Under the lights of the present case report, following conclusions were withdrawn:

PLVs are helpful restorations in correction of cross-bite by preserving enamel tissue, preparing an overlap finishing with a mini-chamfer, and taking action against functional loads during eccentric movements.

Conflict of Interest

None

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